Stream Alteration—Altering or channelizing the path of a stream to bypass all or some disturbed areas on a site, allows additional mining activities, and avoids contamination of stream water by disturbed lands. This practice is complicated, however, by the need to restore the channel when mining operations end.

Drop Structures—Drop structures are large angular rocks placed in a V-shaped pattern to slow the velocity of storm water runoff. These structures are typically reinforced by logs or large rocks imbedded in the streambanks.

d. Sediment Control and Collection. Sediment control and collection limits movement and retains sediments from being transported offsite. Several structural collection devices have been developed to remove sediment from runoff before it leaves the site. Several methods of removing sediment from site runoff involve diversion mechanisms previously discussed, supplemented by a trapping or storage device. Structural practices typically involve filtering diffuse storm water flows through temporary structures such as straw bale dikes, silt fences, brush barriers or vegetated areas.

Structural practices are typically low in cost. However, structural practices require periodic removal of sediment to remain functional. As such, they may not be appropriate for permanent use at inactive mines. However, these practices may be effectively used as temporary measures along haul roads and access roads.

Plastic Matting, Plastic Netting, and Erosion Control Blankets—These BMPs are used to protect bare soils to control dust and erosion. Mats and blankets help to promote vegetative growth by maintaining moisture and heat within the soil. Plastic matting and netting improve slope stabilization and may be used as a permanent treatment to encourage grass growth. Plastic netting is a more effective material to use while promoting growth of vegetation as it permits sunlight to penetrate through to the soils. Erosion control blankets also stabilize slopes, and control erosion. These blankets may be made of jute, or plastic netting, but are more expensive than straw.

Mulch-straw or Wood Chips— Mulches and wood chips are useful temporary covers for bare or seeded soils, with an erosion control effectiveness rating of 75 to 98 percent.⁶¹ Like matting, mulch-straw or wood chips help soils retain moisture and warmth to promote vegetative growth. Used on slopes and/or in combination with nylon netting, these materials may prevent erosion by wind and water. Over time, however, the mulch cover will decrease in effectiveness.

Compaction—Soil compaction using a roller or other heavy equipment increases soil "strength" by increasing its density. More dense soil is less prone to erosion and long-term soil settlement. The surface of compacted soils should be roughed and seeded or vegetated to increase its durability.

Sediment/Settling Ponds—Sediment ponds function as sediment traps by containing runoff for long periods of time, allowing suspended solids to settle. These structures can achieve a high removal rate of sediment for both process wastewater and storm water discharges. Sediment/settling ponds are easily constructed and require minimal maintenance. Their flexibility to treat both process wastewater and storm water makes the use of ponds a desirable treatment for discharges from ore mining and dressing facilities. Of course, site characteristics must be such that some or all discharges can be practically channeled to a centralized area for treatment. Where this is not practical, the cost of constructing multiple sediment ponds may become prohibitive. In addition, periodic dredging may be required in order to maintain the capacity of these ponds.

Discharge ponds may also be designed to act as surge ponds which are designed to contain storm surges and then completely drain in about 24 to 40 hours, and remain dry during times of no rainfall. They can provide pollutant removal efficiencies that are similar to those of detention ponds.⁶² Storm surge ponds are typically designed to provide both water quality and water quantity (flood control) benefits.

Gabions, Riprap, and Native Rock Retaining Walls—These BMPs are all forms of slope stabilization. Gabions consist of rocks (riprap) contained by rectangular wire boxes or baskets for use as permanent erosion control structures. Riprap consists of loose rocks placed along embankments to prevent erosion. Native rock retaining walls are another form of slope stabilization, with walls up to five feet in height, constructed from native rock to reinforce a steep slope.

Biotechnical Stabilization— Biotechnical stabilization uses live brush imbedded in the soils of a steep slope to prevent erosion. This method relies on the premise that the imbedded vegetation will eventually take root and help stabilize the slope.

Straw Bale Barrier–Straw bales may be used as temporary berms, barriers, or diversions, capturing sediments and filtering runoff. When installed and maintained properly, these barriers remove approximately 67 percent of the sediment load.⁶³ These barriers are applicable across small swales, in ditches, and at the toe of bare slopes where there is a temporary, large volume of sediment laden runoff.

Sediment Traps or Catch Basins— These temporary or permanent structures are useful for catching and storing sediment laden storm water runoff and are particularly useful during construction activities to contain runoff. The effectiveness of these BMPs is better in smaller drainage basin areas. Sediment traps are less than 50 percent effective in removing sediment from storm water runoff.⁶⁴

Vegetated Buffer Strips—The installation of vegetated buffer strips will reduce runoff and prevent erosion at a removal efficiency rate of 75 to 99 percent depending upon the ground cover.⁶⁵ In addition, vegetated buffer strips catch and settle sediment contained in the storm water runoff prior to reaching receiving waters.

Silt Fence/Filter Fence—A low fence made of filter fabric, wire and steel posts, should be used on small ephemeral drainage areas where storm water collects or leaves a mine site. Silt fences remove 97 percent of the sediment load and are easier to maintain and remove without creating lasting impacts to the environment.⁶⁶ Silt and filter fences need to be inspected periodically, and may not be as effective as straw bales, since fabric may become clogged with fine particles preventing water flow.

Silt fences may have limited applicability for large areas: they are most effective for use in small drainage areas. These fences may also be used in conjunction with nonstructural practices to maintain the integrity of soil prior to the establishment of vegetation.

Siltation Berms—Siltation berms are typically placed on the downslope side of a disturbed area to act as an impermeable barrier for the capture and

⁶¹ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990.

⁶² "Urban Targeting and BMP Selection," EPA, Region V, November 1990.

⁶³ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–74.

⁶⁴ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–26.

⁶⁵ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–7.

⁶⁶ "Sediment and Erosion Control: An Inventory of Current Practices—Draft," EPA, April 20, 1990, page IV–75.